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09/727,242	11/30/2000	Hongyang Chao	P/3483-13	4365

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EXAMINER	
JOHNSON, TIMOTHY M	
ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 12/09/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

9e

Office Action Summary

Application No.	Applicant(s)
09/727,242	Chao et al.
Examiner	**Group Art Unit**
T. Johnson	2625

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

☒ Responsive to communication(s) filed on 9/26/2.

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 22-32 is/are pending in the application.

Of the above claim(s)_____ is/are withdrawn from consideration.

☐ Claim(s)_____ is/are allowed.

☒ Claim(s) 22-32 is/are rejected.

☐ Claim(s)_____ is/are objected to.

☐ Claim(s)_____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The proposed drawing correction, filed on_____ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on_____ is/are objected to by the Examiner.

☑ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 11 9(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number)_____.

☐ received in this national stage application from the International Bureau (PCT Rule 1 7.2(a)).

*Certified copies not received:_____.

Attachment(s)

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s)._____

☐ Interview Summary, PTO-413

☒ Notice of Reference(s) Cited, PTO-892

☐ Notice of Informal Patent Application, PTO-152

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Other_____

Office Action Summary

Part III Detailed Action

RCE – Request for Continued Examination

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 26, 2002 has been entered.

Disclosure

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The Examiner suggests the following title:

"Image Compression using an integer reversible wavelet transform with a property of precision preservation".

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C 112:

The specification shall contain a written disclosure of the invention, and the manner and process of making an using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 28 and 31 are rejected under 35 U.S.C. 112, first paragraph, because the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention.

For claim 28, lines 1-2, the specification does not teach "selecting an image filter prior to the wavelet transform step".

The wavelet transform uses hierarchical stages of filters, but these filters are not selected prior to the wavelet transform step as claimed, so the Applicant cannot be referring to the wavelet transform filters.

The specification recites in the paragraph bridging pages 14-15, that users "can choose ... filters at compression time" (emphasis added). At "compression time" does not teach "prior to the wavelet transform step" as claimed. In that same paragraph, the specification further recites that "the method can also be implemented to automatically detect and apply the selected filters following decompression" (emphasis added). Furthermore, the only evidence of filtering, not including the wavelet transform filters, is filtering after compression, i.e. "post compression" – Fig. 5, block 48; Fig. 9, block 130; Fig. 11, block 166; Fig. 12, block 188.

The Applicant argues that prior filtering is "described in the specification", but does not show where or how the specification does so.

The Applicant argues that since filtering is well known and well within the level of one of ordinary skill in the art, 112 first paragraph does not apply. The Examiner respectfully disagrees. If the Applicant is claiming it as part of the invention, then the Applicant must support the limitation in accordance with 112 first paragraph. Conversely, since the Applicant admits that such a limitation is conventional and well known on page 3 of the amendment filed August 2, 2002, then this limitation is rejected accordingly.

For claim 31, lines 1-2, a "data file comprising: a wavelet transformation of a data file" is not supported by the specification. The specification only supports wavelet transformation of a data file.

5. The following is a quotation of the second paragraph of 35 U.S.C 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 31 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

For claim 31, lines 1-2, a "data file comprising: a wavelet transformation of a data file" is

unclear. What is meant by a data file that comprises a wavelet transform of a data file? How can a data file perform a wavelet transformation?

Claim Rejections - 35 USC § 101

7. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

8. Claim 31 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 31 is essentially and merely claiming a data file. Data per se is non-functional descriptive material, and is not a process, machine, manufacture, or composition of matter, and is therefore not statutory under 35 U.S.C. 101.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 22-24 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolarov et al., 6,144,773.

For claim 22, a method of compressing a data file having data elements each represented by a number of bits is provided by Kolarov in at least Fig. 3a, blocks 301 to 309, indicating a file and bits, c. 11, line 35 – c. 12, line 67, and bits are further provided by Kolarov in at least c. 7, lines 15-19. Performing a wavelet transformation of the data file to provide a series of wavelet coefficients, each of the coefficients being represented by a number of bits having a maximum count no greater than a number of bits representing each of the data elements is provided by Kolarov by at least the compression in Figs. 3a, and 4a – 4c, particularly, steps 309

and 326 in Fig. 3a, the fourth full paragraph in c. 12, and c. 19, line 19 – col. 20, line 13. Discarding wavelet coefficients that fall below a predetermined threshold value is provided by Kolarov in at least the last full paragraph in c. 9 and the paragraph bridging cols. 9-10, where Kolarov also uses the zerotree coding as well, but on a modified tree ("G-tree"). See also the third full paragraph in c. 1 for a further suggestion of this conventionality. Quantizing remaining wavelet coefficients which fall above a predetermined threshold value to provide a quantized series of wavelet coefficients is considered provided by Kolarov in at least the second full paragraph in c. 5, the first full paragraph in c. 8 (quantization is explicitly recited), the first full paragraph in c. 14, the last full paragraph in c. 19, at least the last two full paragraphs in c. 9, which is analogous to Kolarov, except Kolarov uses different trees. Thus, quantizing is at least obviously, if not inherently, provided by Kolarov. It would've been obvious to one having ordinary skill in the art at the time the invention was made to understand that the thresholding of Kolarov is quantization by definition, where more important data, i.e. data with higher entropy information content are thresholded out from other data in the categorization process of Kolarov, so that the concept of quantization is taught by Kolarov, and because quantization is one of the three basic steps in compression, so that it is basically required where cited above by Kolarov. It further would've been obvious to one having ordinary skill in the art at the time the invention was made to quantize the data of Kolarov with a threshold, since the prior art, e.g. Said-Pearlman, incorporated by reference – last full paragraph in c. 8, of which Kolarov is a modification – c. 16, lines 38-48, and c. 17, lines 30-34, "have proposed a very fast and efficient method to bit encode wavelet coefficients" in c. 8, lines 56-59, and with thresholding for quantizing the coefficients in the subband tree in the last full paragraph in c. 9. Compressing the quantized series of wavelet coefficients to provide a compressed data file is provided by Kolarov in at least Fig. 3a, the abstract, the second and third full paragraph in c. 5, and the first full paragraph in c. 8.

For claim 23, wherein the compressing step comprises the step of applying an entropy coding to the quantized series of wavelet coefficients is provided by Kolarov in at least Fig. 3a, the abstract, the second and third full paragraph in c. 5, and the first full paragraph in c. 8.

For claim 24, wherein the entropy coding is selected from the group of arithmetic, Huffman, run length and Huffman combined is provided by Kolarov in at least Fig. 3a, the abstract, the second and third full paragraph in c. 5, and the first full paragraph in c. 8.

For claim 31, see the rejection of at least claim 22. See the third full paragraph in c. 14 indicating a compressed data file created by the file compression process in at least Fig. 3a. Since the quantization of Kolarov does not increase the number of bits, the same argument above with respect to claim 22 applies.

For claim 32, see the rejection of at least claim 22. A program with routines is further provided by Kolarov in at least the four full paragraphs in c. 7.

11. Claims 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolarov et al., 6,144,773, as applied to claims 22-24 and 31-32 above, and further in view of Ferriere, 5,880,856.

For claim 25, performing a color transformation of the data file prior to the wavelet transform is suggested by Kolarov by identifying a color function in at least step 313 in Fig. 3 noted in the last full paragraph in c. 12, but does not necessarily provided for the color being transformed. It is very common to transform the color with transformed based coding, such as wavelet, and is provided by Ferriere in at least Fig. 4. It would've been obvious to one having ordinary skill in the art at the time the invention was made to perform a color transform to the wavelet transformation step with the input image file of Kolarov, as taught by Ferriere, since his color conversion decouples the luminance, so that processing such as display preview is provided by Ferriere in at least the first full paragraph in c. 9, and because such color conversions either provide for compression per se, or a amenable to compression.

For claim 26, wherein the quantizing step comprises sub-band orientation quantization is considered provided by Kolarov, since the trees, as a result of wavelet decomposition, of Kolarov are oriented with respect to subbands, such as the example shown in at least Fig. 2, and

quantizes the subbands as a function of the subband or wavelet tree. Further evidence is provided by Kolarov in the last full paragraph in c. 8, indicating that the tree based coding is a spatial orientation tree, and is quantized according to Kolarov as a modification of the Said-Pearlman technique. It would've been obvious to one having ordinary skill in the art at the time the invention was made that Kolarov provides for the subband orientation quantization, or that it can be used with Kolarov, since the subband trees are spatially oriented and quantized as a function of the subband oriented tree. The subbands are indicated in at least Figs. 1c and 1d, but also in the paragraph bridging cols. 2-3, and the subbands are again referred to (e.g. HL) in c. 16, lines 20-39.

12. Claims 27 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolarov et al., 6,144,773, and Ferriere, 5,880,856, as applied to claims 25-26 above, and further in view of Said et al., "An Image Multiresolution Representation for Lossless and Lossy Compression".

For claim 27, wherein the wavelet transformation step comprises integer wavelet transformation is not explicitly provided by Kolarov, but Kolarov does provide for the wavelet transformation by lifting, which either does or can use integer processing. Said (referred to as Said instead of Said-Pearlman noted above for differentiating the two) provides for the conventionality of integer transformation in hierarchical coding (e.g. wavelet coding) in at least the abstract. See also the paragraph bridging the columns on page 1308 indicating that the transform of Said is similar to the wavelet transformation technique of EZW. It would've been obvious to one having ordinary skill in the art at the time the invention was made to implement the lifting scheme of Kolarov with the integer transformation of Said, since the integer transformation provides for "fast inspection", and because Said also provide for efficient compression.

For claim 29, wherein the integer wavelet transformation comprises biorthogonal filter method is provided by Kolarov in at least the second full paragraph in c. 4, the fourth full paragraph in c. 5, and the first full paragraph in c. 8.

For claim 30, wherein the integer wavelet transformation comprises the correction method is not explicitly provided by Kolarov. Said et al. teach that it is well known to use the correction method for integer wavelet transforms starting in the paragraph bridging pages 1303 – 1304 and primarily in section II on page 1304, where the S+P transform used by Said et al. is a correction method (that Said et al. provide for a "correction method" is further indicated by the Applicant's specification on page 38, lines 13-15). It would've been obvious to one having ordinary skill in the art at the time the invention was made to use a correction method, as taught by Said et al., with one of the transforms of Kolarov, since "the S+P transform yields more compression than single-resolution linear predictive coding methods of similar complexity, and can be calculated with a very small computational effort", because Said et al. "propose entropy-coding methods that exploit the multiresolution structure and that can efficiently compress the S+P transformed image for progressive-resolution transmission", because Said et al. "propose an embedded coding method, and show that its rate distortion function is comparable to those of the most efficient lossy compression methods" for "progressive-fidelity transmission", and that the "compression rates obtained with both types of progressive transmission are among the best in the literature", so that "with the proper image transformation, fast inspection schemes can be readily combined with lossless compression, resulting in a negligible penalty in both compression efficiency and coding complexity", as taught by Said in the paragraph bridging pages 1303-1304.

13. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kolarov et al., 6,144,773, as applied to claims 22-24 and 31-32 above, and further in view of Walker, 6,222,881.

For claim 28, selecting an image filter prior to wavelet transformation is not explicitly provided, but may be considered provided by Kolarov as noted above depending on the Applicant's meaning of filter. In any case, for the conventionality of "selecting an image filter prior to" transformation for compression, Walker provides for this in at least block 406 in Figs. 4-5, and the paragraph bridging cols. 5-6. It would've been obvious to one having ordinary skill in the art at the time the invention was made to select a filter, such as with noise reduction filtering, before compression, which includes transformation for compression as taught by Walker with the

compression of Kolarov, since the broad term "filtering" provides for enhancements and other various desirable functions such as enhancing the quality requirements prior to compression, such as the wavelet compression of Kolarov.

Response to Amendment

14. Applicant's arguments filed August 2, 2002 have been fully considered but they are not persuasive.

The Applicant argues on pages 3-4 of the amendment that the 112 first paragraph rejection should be withdrawn.

The Examiner respectfully disagrees. See the arguments above where the 112/1 is maintained.

The Applicant argues on pages 4-9 of the amendment that none of the prior art of record, particularly Kolarov, provides for each wavelet coefficient being "represented by a number of bits having a maximum count no greater than a number of bits representing each of the data elements" of the image, since Kolarov "focuses on operations performed after wavelet coefficients have already been obtained, and because the wavelet transform of Kolarov is conventional.

The Examiner respectfully disagrees. To simply understand what is claimed, lets use an example. In accordance with the Applicant's claim and invention, if a pixel is represented by N bits, e.g. N=8, then the wavelet coefficient is represented with a number of bits not greater than N bits, e.g. N=8. Kolarov teaches that it is very common for a pixel to be represented by 8 bits – fourth full paragraph in c. 12. The Examiner agrees with Kolarov, for example, 8 bits per pixel is typically what you see when looking at your computer screen (8 bits per pixel for each color). Kolarov also notes that in the case of medical images such as x-rays, the image may require the accuracy of 12 bits per pixel. So Kolarov teaches either 8 or 12 bits per pixel. In c. 19, line 19 – c. 20, line 5, Kolarov shows a binary representation of 8 bits per wavelet coefficient, which is "no greater than a number of bits representing each of the data elements", i.e. pixels of the image, just as claimed.

Contact Information

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy M. Johnson whose telephone number is (703) 306-3096, or the Supervisory Patent Examiner, Bhavesh M. Mehta, whose telephone number is (703) 308-5246.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone numbers are (703) 305-4700 or (703) 305-4750, or Customer Service at (703) 306-0377.

The Group Art Unit FAX number is 703-872-9314.

TJ

Timothy M. Johnson
Patent Examiner
Art Unit 2625
December 05, 2002

TIMOTHY M. JOHNSON
PRIMARY EXAMINER